National Institute of Environmental Health Sciences

Direct and indirect effects of climate change on the risk of infection by water-transmitted pathogens

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Year: 2013
Journal: Environmental Science & Technology. 47 (22): 12648-12660

Abstract:

Climate change is likely to affect the infectious disease burden from exposure to pathogens in water used for drinking and recreation. Effective intervention measures require quantification of impacts of climate change on the distribution of pathogens in the environment and their potential effects on human health. Objectives of this systematic review were to summarize current knowledge available to estimate how climate change may directly and indirectly affect infection risks due to Campylobacter, Cryptosporidium, norovirus, and Vibrio. Secondary objectives were to prioritize natural processes and interactions that are susceptible to climate change and to identify knowledge gaps. Search strategies were determined based on a conceptual model and scenarios with the main emphasis on The Netherlands. The literature search resulted in a large quantity of publications on climate variables affecting pathogen input and behavior in aquatic environments. However, not all processes and pathogens are evenly covered by the literature, and in many cases, the direction of change is still unclear. To make useful predictions of climate change, it is necessary to combine both negative and positive effects. This review provides an overview of the most important effects of climate change on human health and shows the importance of QMRA to quantify the net effects.

Source: http://dx.doi.org/10.1021/es403549s

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: Climate scenarios developed by the Royal Netherlands Meteorological Institute (KNMI)

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Quality, Food/Water Security, Precipitation, Sea Level Rise, Solar Radiation, Temperature

Extreme Weather Event: Drought, Flooding, Landslides

Food/Water Quality: Pathogen, Other Water Quality Issue

Water Quality (other): Nutrients; Turbidity; Water temperature; Salinity; pH

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Freshwater, Ocean/Coastal

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : The Netherlands

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: Campylobacteriosis, Cryptosporidiosis, Giardiasis, Norovirus, Vibrioses

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content